

# GPS Celestial Navigation

## Longitude Calculation Work Sheet

NAME \_\_\_\_\_

DATE \_\_\_\_\_

rev 6

		Our School	Their School
<b>Measurement Data</b>        	Our Latitude	<input type="text"/> [Degrees]	We are going to
	Our Longitude	<input type="text"/> [Degrees]	compute theirs
	Universal Time of Minimum Shadow Length	<input type="text"/> [HH:MM]	<input type="text"/> [HH:MM]
	Length of Shadow at Minimum Length Time	<input type="text"/> [m m]	<input type="text"/> [m m]
	Sun Angle at Minimum Length Time	<input type="text"/> [Degrees]	<input type="text"/> [Degrees]
	Height of Pole	<input type="text"/> [m m]	<input type="text"/> [m m]
	Direction of Pole's Shadow	<input type="text"/> North or South	<input type="text"/> North or South

	Ours	Theirs
<b>Time</b>	Universal Time of Minimum Shadow Length	
	<input type="text"/> [HH:MM]	<input type="text"/> [HH:MM]
	Convert into Minutes into the day = Hours x 60 + minutes	
	<input type="text"/> [Minutes]	<input type="text"/> [Minutes]
	<input type="text"/> [Minutes] = Time Difference =	<input type="text"/> [Minutes] - <input type="text"/> [Minutes]
	<i>(If a negative result, keep only the positive magnitude)</i>	

**Compute Their Longitude**

[degrees] = Longitude Difference =  $\frac{\text{Time Difference } \boxed{\phantom{000}} \text{ [Minutes]}}{4 \text{ [minutes per one degree Earth rotation]}}$

$$\boxed{\phantom{000}} \text{ [degrees]} = \text{Their Longitude} = \boxed{\phantom{000}} \text{ [degrees]} + / - \boxed{\phantom{000}} \text{ [degrees]}$$

If we are in Eastern Hemisphere and

If our shadow is shorter earlier	-
If our shadow is shorter later	+

If we are in Western Hemisphere and

If our shadow is shorter earlier	+
If our shadow is shorter later	-

**Corrected Longitude**

If their longitude is  $< 0$  degrees, then they are across the Prime Meridian (make the result positive and in your opposite hemisphere).

If their longitude is  $> 180$  degrees, then they are across the International Date Line  
(subtract 360 degrees, make positive, and in your opposite hemisphere).

Their Longitude =  [degrees] East or West